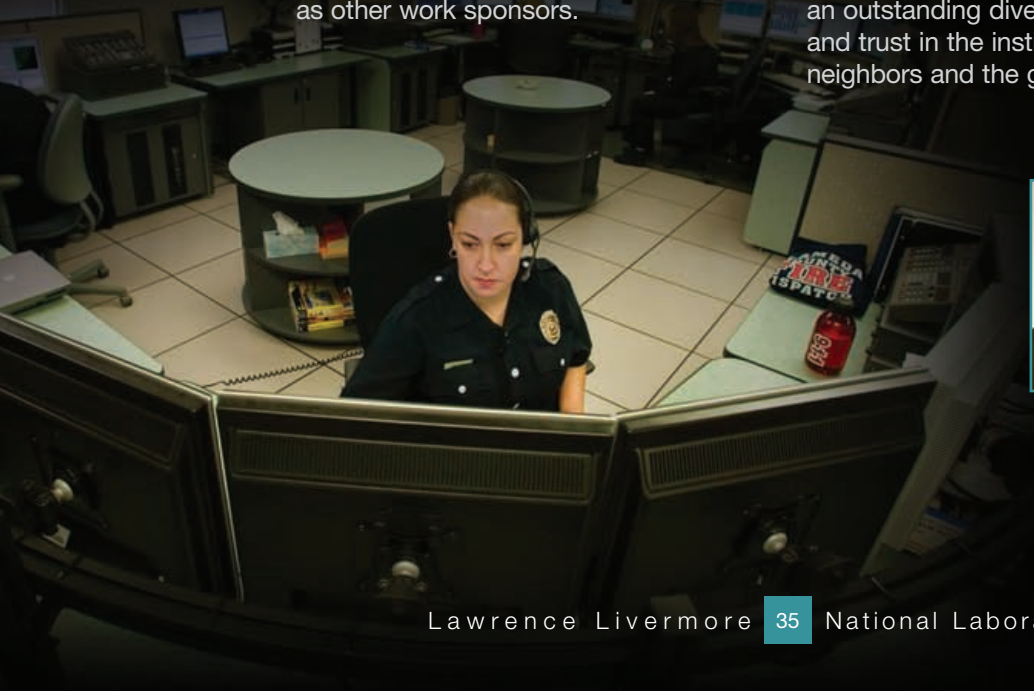
Making Our Future

Since its founding, the Laboratory has sustained a remarkable focus on mission. Multidisciplinary teams execute work in the tradition of Laboratory cofounder E.O. Lawrence, who demanded scientific and technical excellence. Not surprisingly, "Passion for Mission" tops the list of our shared values. LLNS, the new management and operating contractor, is fully committed to the Laboratory's long-held values and carrying on the tradition of scientific and technical excellence in service to the nation.

The vision for the Laboratory is to provide national security in a global context. We bring technical leadership to the transformation of the nuclear weapons complex, deliver exceptional science and technology, expand our work for other sponsors, and enhance operational performance. This vision calls for change at the Laboratory and in our working relationships with our primary customer, NNSA, as well as other work sponsors.

A challenge within the Director's Office is to lead the way through changes to make the Laboratory's future. One major thrust is to improve cost efficiency as we sustain our reputation for mission delivery and scientific and technical excellence. We are drawing on best practices, lessons learned, and expertise from across the Laboratory and LLNS's parent organizations to achieve consistently high standards in work performance. We are also enhancing safety and security as well as our capabilities and systems to provide assurance to NNSA and ourselves that we are meeting our performance goals.

A second major thrust is to ensure that the Laboratory is appropriately sized and has a workforce with the proper mixture of skills to meet the future. As Livermore undergoes change—at times stressful—we are keeping the big picture in mind: the importance of service to the nation, an outstanding diverse workforce, and trust in the institution by our neighbors and the general public.



Steve Liedle
Deputy Laboratory Director

Laboratory director George Miller serves as president of Lawrence Livermore National Security, LLC, the new public–private partnership that began managing and operating the Laboratory on October 1.

LLNS Takes Charge

On October 1, 2007, a newly formed public–private partnership, LLNS, began its contract with DOE to manage and operate the Laboratory. LLNS is a limited-liability company made up of Bechtel National, Inc., UC, Babcock & Wilcox Company, the Washington Group Division of URS Corporation, and Battelle. Four small business subcontractors and Texas A&M University are also members of the team. Laboratory director George Miller serves as president of LLNS and reports to NNSA and the LLNS Board of Governors.

LLNS brings together an enormous experience base. Bechtel is the largest project management contractor in the U. S., and UC is the world's largest academic research institution. Babcock & Wilcox Company and the Washington Group Division of URS Corporation are the top two DOE nuclear facilities contractors. Between them, they manage and operate four of DOE's five safest sites. Battelle is a national leader in managing research and development laboratories and commercializing technology. As an academic affiliate of LLNS and a major university system, Texas A&M adds strengths in national and homeland security science and policy areas.

The parent organizations contribute to the success of the Laboratory through their oversight of performance, primarily executed through a Board of Governors. Seven board committees provide oversight support, review strategic plans, and advise on future trends and challenges. Systems, tools, and best practices, such as AIM (assess, improve, and modernize) teams, are being brought into Livermore from the parent organizations. An AIM team arrived in November to review nuclear operations, identify improvement activities, and suggest possible "imports" from other sites. More such AIM reviews will occur during this fiscal year.

Individuals from many Laboratory organizations prepared for the transition and then worked wih the Lawrence Livermore National Security, LLC, transition team after their arrival in May.

Making the Transition

Transition to LLNS management of the Laboratory formally began with DOE's announcement of the selection in May 2007, following the first open competition for managing Lawrence Livermore. One of the LLNS partners—UC—had operated the Laboratory since its inception in 1952 as part of E. O. Lawrence's Radiation Laboratory.

Almost a year before the contract award, pre-transition activities started to prepare for the process of transferring people, property, and procedures as well as contracts, formal agreements, and liabilities to the new contractor. The team identified more than 1,600 activities that had to be carried out, many of them driven by the change from a not-for-profit to a private entity. Throughout the process, the Laboratory maintained a Web site to keep employees informed and answer questions about the transition. Communication efforts also included a benefits hotline, frequent features in the Laboratory's newspaper, *Newsline*, and on-site and off-site briefings to employees and retirees.

Many transition tasks were formidable. For example, the complete organizational structure of the Laboratory was documented, and more than 7,700 offer letters were mailed. The transition team, assisted by 18 Laboratory hazards control experts, conducted a walkdown and assessed more than 7.5 million square feet of facilities. A complete inventory of all Laboratory assets, comprising more than 62,000 pieces of property valued at $1.3 billion, was reviewed. All of the Laboratory's roughly 900 policies and procedures also were reviewed, and more than 3,000 subcontracts were formally transferred to the new LLC.

Two special events on September 25 marked the end of the transition. The LLNS Board of Governors held its first meeting at the Livermore site. The board reviewed readiness reports prepared by transition team leaders and future plans for the Laboratory presented by the incoming management team. At a noontime gathering, employees celebrated the Laboratory's UC heritage with lunch, displays by directorates, and distribution of a Laboratory photo history book commissioned by UC. The formal program that followed included the screening of a video recollecting the shared history with UC, remarks by UC President Robert Dynes, and personal observations from a panel of former Laboratory leaders.

At an event commemorating the Laboratory's 55-year connection to the University of California, director George Miller applauds as University President Robert Dynes receives a box of thank you notes from Laboratory employees. The cover of a photo history book appears in the background.

Managing Budget Realities

In anticipation of the impending contract competition, the Laboratory began in FY 2006 to aggressively cut costs and restricted hiring to "right-size" the workforce. The management change from a not-for-profit to a private entity led to additional costs. However, contract costs are higher than expected, and the number of employees leaving the Laboratory in FY 2007 was much smaller than in a normal year. In September, with federal budget uncertainties looming, NNSA Administrator Tom D'Agostino directed each of the NNSA site contractors to actively collect information and prepare documents necessary to meet the legal requirements associated with "workforce restructuring." The need for further downsizing and greater cost efficiency was apparent.

The Laboratory has formed a task force to identify and implement ways to reduce Laboratory operating costs. More than $34 million in savings were initially found and cost-reduction efforts continue. The Laboratory also began drafting for NNSA a general workforce restructuring plan that would provide the basis for implementing a specific plan if one were warranted. In addition, in mid-November, the Laboratory announced significant reductions in its supplemental and flexible workforces for January 2008.

When the budget situation clarified—with about a $100 million cut for FY 2008—the Laboratory decided a restructuring of the permanent workforce was needed to further reduce the size of the Laboratory by about 10 percent. In Laboratory-wide meetings, Laboratory Director George Miller

Former Laboratory leaders shared their recollections of the the Laboratory's history with the University of California.

acknowledged that the process would be stressful but was necessary for Livermore to become "more capable, more cost effective, and more competitive." The specific plan seeks to mitigate the impact of reductions by starting with a voluntary phase. The plan is designed to shape the workforce in a way that positions Livermore for FY 2009. The Laboratory will maintain the critical skills, special capabilities, and diversity necessary to sustain Livermore's intellectual vitality, meet mission deliverables, add new customers, and perform work safely, securely, and efficiently.

Improving Security and Emergency Response

The Laboratory operates routinely at a heightened security level. Continual improvements are being made in cyber security. As a site with Security Category I/II special nuclear materials, Livermore requires the highest level of protection. Beginning in 2003, the Laboratory significantly upgraded its security posture by adding a number of officer survivability features, deploying force multiplier technology, and further hardening potential targets. This approach allowed Livermore to successfully meet the required protection criteria with a minimal increase in recurring costs. The Laboratory continues to adjust its security posture consistent with DOE requirements and the complex restructuring and consolidation initiative.

Effective implementation of Livermore's Integrated Safeguards and Security Management (ISSM) helps to ensure that security is a top priority for all employees. Individual and collective responsibilities for safeguards and security are made clear to Laboratory personnel, who are required to complete necessary training. Line management is accountable for performance and conducts an annual self-assessment in the areas of classified removable electronic media, locks and keys, security incident prevention, and implementation of ISSM.

The Alameda County Regional Emergency Communications Center, located at the Laboratory, installed a new computer-aided dispatch system in May.

The Central Alarm Station Upgrade Project, completed at the beginning of the year, benefits both safety and security as well as Livermore's Emergency Response Programs. The upgrade provides the capability to contact, without delay, qualified experts to respond to national, DOE, or Laboratory emergencies. The Laboratory also benefits directly from being the host site for the Alameda County Regional Emergency Communications Center. In 2007, the center was upgraded with the installation of a new computer-aided dispatch system, reducing response times and providing real-time information to both the dispatcher at the center and firefighters in the field. The center dispatches for a consortium of public safety agencies within Alameda County, which jointly funded the $1.2 million project. With the change to LLNS management, fire protection service at the Laboratory is now provided by contracted Alameda County Fire Department firefighters.

Ties to the Community

In early October, the Laboratory hosted Community Leader Day at the Bankhead Theater in downtown Livermore. The event provided an opportunity for members of neighboring government, education, and business groups to meet and mingle with the new Laboratory senior management team. More than 450 officials and representatives from throughout the local area attended and heard about LLNS and the Laboratory's plans for the coming year. The ceremony ended with the presentation of a $10,000 check from the LLNS Board of Governors to the Livermore Valley

Performing Arts Center, which first opened its doors that week. The donation was the first such corporate contribution to be presented by LLNS.

In the annual Help Others More Effectively (HOME) Campaign, Laboratory employees raised more than $1.4 million and LLNS acknowledged the employees' contribution with a $1 million match. The $2.4 million total represents the largest amount ever raised in more than 30 years of the HOME Campaign. The charitable drive benefits more than 400 community and nonprofit agencies in the Livermore/Tri-Valley area, San Joaquin Valley, and greater San Francisco Bay Area.

In addition to the HOME Campaign, Laboratory employees participate in educational outreach programs as well as various charitable and economic development organizations. More than 500 staff members each year volunteer their time to serve as science lecturers, mentors, science fair judges, and presenters or instructors in workshops and classrooms. Two of the more prominent activities are "Science on Saturday" and the local Tri-Valley Science and Engineering Fair.

"Science on Saturday" is a series of free lectures and demonstrations by top Livermore researchers—together with local school teachers—on topics at the forefront of science and technology. It is held in both Livermore and Tracy, California. Hosted by the Laboratory at a community center in Livermore, the Tri-Valley Science and Engineering Fair motivates more than 200 local students in grades 7 through 12 to apply their creativity to the solution of science, engineering, and math problems. They compete for cash and other prizes, with their science projects evaluated by more than 100 judges, many of whom are Laboratory employees.

On behalf of Lawrence Livermore National Security, LLC, Laboratory director George Miller presented the organization's first-ever corporate contribution.

"DNA Day" was one of many educational outreach programs in 2007. Nearly 700 fifth-graders in Tracy, California, participated in this event and made DNA necklaces to commemorate the completion of the Human Genome Project in April 2003 and the discovery of DNA's double helix in 1953.

People and Programs in the News

Livermore stays vibrant by attracting and retaining a high-quality, diverse workforce that is dedicated to excellence. The strength of the current workforce is demonstrated by the many awards received for scientific accomplishments and quality operations. However, science isn't the whole story at Lawrence Livermore. Many other individuals and teams are also recognized for their contributions both inside and outside the Laboratory.

Laboratory scientists and engineers were responsible for 161 invention disclosures, 125 U.S. patent applications, 29 first foreign patent applications, 62 issued U.S. patents, and 21 issued foreign patents in fiscal year 2007.

The American Physical Society honored John Lindl with the 2007 James Clerk Maxwell Prize for Plasma Physics. Lindl, chief scientist for the National Ignition Facility and Photon Science Directorate, was lauded for 30 years of contributions in high-energy-density physics and inertial confinement fusion research.

Nearly 40 Laboratory scientists contributed to the Intergovernmental Panel on Climate Change (IPCC), which, along with former vice president Al Gore, won the Nobel Peace Prize. The Laboratory's Program for Climate Model Diagnosis and Intercomparison has made major contributions to all of the IPCC reports, from the First Assessment Report in 1990 to the 2007 Fourth Assessment Report (see p. 18).

Tomás Díaz de la Rubia, associate director for Chemistry, Materials, Earth, and Life Sciences, was named a fellow of the American Association for the Advancement of Science. Later in the year, he was tapped to be a co-editor-in-chief of the new Springer journal *Scientific Modeling and Simulation*.

Peter Celliers, Jim De Yoreo, and Denise Hinkel were named fellows of the American Physical Society. Celliers was recognized for improving ways of measuring shock waves used to study material states. De Yoreo (now at Lawrence Berkeley National Laboratory) was honored for work using in situ atomic force microscopy to understand the physical principles underlying bio-crystallization. Hinkel was cited for contributions to laser–plasma interaction physics and radiation hydrodynamic design of inertial-confinement fusion targets.

A team of scientists from the Laboratory and IBM won supercomputing's Gordon Bell Prize for the third year running. Their entry, "Extending Stability Beyond CPU Millennium: A Micron-Scale Simulation of Kelvin-Helmholtz Instability," was able to study, for the first time, how this physical phenomenon develops from atomic-scale fluctuations to larger vortices (see p. 8).

The American Institute of Chemical Engineers elected safety analysis engineer Diane Spencer as a fellow for her advocacy on behalf of her profession. She has educated California legislators about updating laws and serves as a delegate for the California Legislative Council of Professional Engineers.

Management and People

The Institute of Electrical and Electronics Engineers Computer Society awarded the 2007 Sidney Fernbach Memorial Award to David Keyes. He was honored for his contributions to Newton-Krylov-Schwarz methods for the efficient solution of nonlinear partial differential equations, which have enabled users to make efficient use of parallel computers, from small clusters to the world's largest computers.

The Laboratory won five R&D 100 awards among the 100 awarded by *R&D Magazine* for the top industrial innovations worldwide in 2007. The Laboratory has received a total of 118 awards since 1978. The 2007 winning technologies include:

- A microelectromechanical systems (MEMS)-based Adaptive Optics Scanning Laser Ophthalmascope, which could revolutionize retinal imaging, providing eye doctors with the capability to better detect, diagnose, and treat blinding retinal diseases.

- The Noninvasive Pneumothorax Detector, a handheld instrument that can detect in real time when air is trapped in the space between the wall of the chest cavity and the lung. The award was shared with Electrosonics Medical Inc., of Cleveland, Ohio, which licensed the technology.

- Continuous-Phase-Plate Optics, an important breakthrough for the National Ignition Facility. These optics, developed in conjunction with Zygo Corporation of Middlefield, Connecticut, and QED Technologies of Rochester, New York, allow the laser's 192 beams to be optimally coupled to targets.

- A radiation detection system, the Large Area Imager, which was developed in collaboration with Oak Ridge National Laboratory and the UC Berkeley Space Sciences Laboratory. The imager sits in a vehicle moving at speeds up to 25 miles per hour and searches a swath 100 meters wide.

- A software library called *hypre* that allows researchers to more effectively use massively parallel supercomputers and conduct larger, more detailed simulations faster than ever before. *Hypre* provides linear solver algorithms developed specifically for large numbers of processors. Simulations that previously took days can now be run in hours or less.

Two individuals and five teams garnered NNSA Weapons Awards of Excellence. Cliff Shang and George Zimmerman were honored for work in enterprise modeling and code development, respectively. The group awards were given to the Use Control Analysis Team, the Electronic Redbook Team, the Pit Lifetime Team, the Chancellor Drillback Team, and the Nevada Test Site/Readiness in Technical Base and Facilities Program Management Team.

Hriar Cabayan (below, left) was lauded by the Joint Chiefs of Staff for his 10 years as special technology and science advisor in the Joint Staff Directorate of Operations in Washington, D.C. He acted as a liaison and conduit between the laboratories of the Departments of Defense and Energy, other government agencies, and the Combatant Commands.

While on assignment in Washington, D.C., Greg Simonson was honored by the U.S. Air Force with an award for Exemplary Civilian

Service. As senior scientist for the Counter-Chemical, Biological, Radiological, Nuclear and High Yield Explosives Center, he was responsible for improving response capabilities for the Washington, D.C., area.

The White House Office of Science and Technology Policy selected a former Laboratory postdoctoral fellow for the Presidential Early Career Award for Scientists and Engineers. Shawn Newsam, now an assistant professor in the School of Engineering at the University of California Merced, was nominated for work performed while at the Laboratory.

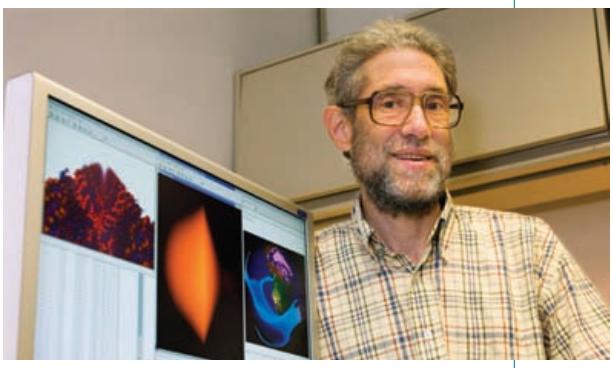
Recipients of the Laboratory's Teller Award for 2007 were Henry Chapman and Dmitri Ryutov. Chapman leads a team that is developing methods to use extremely bright, coherent x-ray beams at the Linac Coherent Light Source to reveal the three-dimensional structures of proteins. Ryutov has pioneered an approach to inertial confinement fusion that uses the Z pinch, an electrical current that compresses plasmas.

The BlueGene/L supercomputer was honored at SC07 for winning three out of four high-performance computing challenges, a set of tests designed to showcase more than LINPACK results.

Arpith Chacko Jacob, a summer intern, won an HPC (high-performance computing) Fellowship Award at SC07.

Several highly successful programs in pollution prevention, waste minimization, and recycling won awards from DOE and external regulatory agencies (see p. 32).

For his pioneering work in scientific visualization, Nelson Max received the Steven A. Coons Award for Outstanding Creative Contributions to Computer Graphics. He was honored by the Association for Computing Machinery's Special Interest Group on Graphics and Interactive Techniques.



The American Society of Technical Engineers named Moe Dehghani as a member of its Committee on Engineering Accreditation. Dehghani had volunteered as an evaluator of engineering programs at many institutions for the past 10 years.

Former associate director for Energy David Baldwin received the 2007 Distinguished Career Award from Fusion Power Associates by the group's Board of Directors. The award recognizes individuals who have made lifelong career contributions to fusion development.

Retired physicist Ken Kulander received the 2008 Will Allis Prize for the Study of Ionized Gases from the American Physical Society. He was a theoretical physicist at the Laboratory from 1978–2001.

Management and People

The Alameda County Women's Hall of Fame selected physicist Hope Ishii (below, third from left) as the 2007 Outstanding Woman in Science. She was honored for research she performed as part of the team that studied bits of dust from the comet Wild 2. The Hall of Fame awards are bestowed each year in 10 categories.

Three teams of employees won awards at a regional competition of the Federal Laboratory Consortium for Technology Transfer. Two awards went to teams that had developed and commercialized a fission meter for identifying radiation and a silver reflector for high-efficiency solar cells. The team that is transforming defense-related research into a compact machine for delivering radiation treatment for cancer won an award for outstanding technology development.

Thomas Luu, Ron Soltz, and Pavlos Vranas won an essay contest sponsored by *Computing in Science and Engineering* magazine for what they would do with a quadrillion floating operations per second (1 petaflops) of computing power. They proposed extending research (described on p. 25) to simulate the birth of the universe.

Ronit Ben Abraham Katz (below), lead treating physician of the Laboratory's Health Services Department, received the American Medical Association Foundation's 2007 International Medical Graduate Physician Excellence in Medicine and Leadership Award. The awards are presented to medical students, residents/fellows, young physicians, and international medical graduate physicians for their strong, nonclinical leadership skills in advocacy, community service, or education.

Rulon Linford and Bill Nevins were appointed to serve on an advisory panel to DOE's Fusion Energy Sciences Advisory Committee.

Twenty-two crafts and machinist employees received journeyman certification following completion of a four-year training program.

The Laboratory's flagship magazine, *Science & Technology Review*, won an Award of Excellence from the Society for Technical Communication's international competition.

The American Society for Training & Development recognized the Employee Organization and Development Division with its BEST award for enterprise-wide employee learning and development.

Postdoctoral fellow Jennifer Giocondi was honored by the Materials Research Society for her poster, "An In-situ AFM Study of the Affect of Magnesium Impurities on Brushite Growth."

The Laboratory's counterintelligence and counterterrorism effort, called the Security Awareness for Employees (SAFE) Program, earned top marks in a Department of Energy inspection for the second year in a row.

After three months of intensive training, eight new security police officers were sworn in at a ceremony in December.